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DORSAL DISLOCATION OF THE TRAPEZOID.

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Dorsal dislocation of the trapezoid, unaccompanied with fracture or dislocation of other bones, occurs so rarely that it may be looked upon as a surgical curiosity. I could find in the *Index Medicus* and in the *Index Catalogue of the Library of the Surgeon-General's Office* the report of only one case. This was recorded by Geo. W. Gay in the *Boston Medical and Surgical Journal* in 1869.

In this paper I shall give a summary of Gay's case, and shall report a case of injury that came to me and was diagnosed and treated as a case of simple uncomplicated dorsal dislocation of the trapezoid.

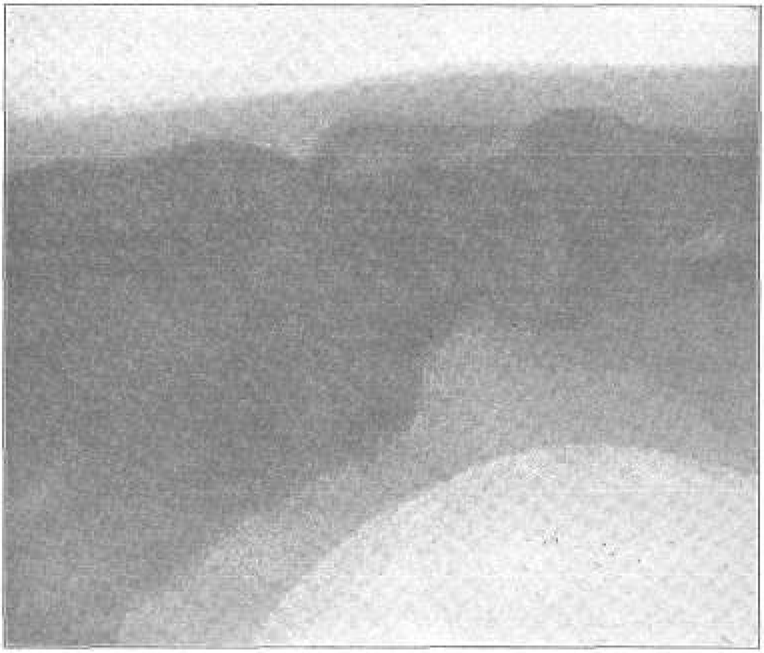
Dr. Gay's patient injured his wrist by striking a post in such a manner that the force was brought to bear on the distal ends of the metacarpal bones of the thumb and index finger. At the time the injury was produced the wrist was in the straight position and the forearm in extension. On examination sixteen hours after the accident occurred there was found an irregular quadrangular swelling situated proximal to the base of the metacarpal bone of the index finger. The swelling seemed to extend about one-quarter of an inch beyond the level of the dorsal surfaces of the other carpal bones. It was not very tender, was of bony hardness, and could not be reduced by pressure. The metacarpal bone of the index finger did not seem shorter than normal. No crepitus was obtained, and no other injury to the wrist or hand observed.

Dr. Gay was unable to reduce the deformity. He extended the hand on the forearm at an angle of forty-five degrees and held it in this position with an anterior splint and with adhesive plaster. At the end of two weeks this dressing was removed. Five weeks later—that is, seven weeks after the injury occurred—the patient was able to move the injured wrist freely and was able to use it without causing him pain. But the deformity remained the same as it was at the time that Dr. Gay first saw the case.

The history of the case that I desire to report is as follows:

A policeman, aged thirty-nine years, struck a man with his fist in such a manner that the entire force of the blow was brought to bear on the distal end of the metacarpal bone of the index finger. The wrist-joint and elbow-joint were slightly flexed at the time the blow was delivered. Immediately afterward he suffered from pain in the injured part. This was not very severe, but was increased by movement of the hand or wrist. The pain gradually diminished till I saw him, two hours after the injury. At this time he was entered as a patient in Cook County Hospital, Chicago. On examination I found the right wrist slightly flexed. Just proximal to the base of the metacarpal bone of the index finger was a cuboidal swelling, of bony hardness, that extended nearly a centimetre beyond the dorsal surfaces of the other carpal bones. This swelling was not easily movable, was not painful, and was but slightly tender on pressure. No crepitus was obtained. The soft structures showed very little swelling; there was no evidence of extravasation of blood. No shortening of the metacarpal bone of the index finger was found, and no widening of the wrist could be made out. No attempt was made to reduce the deformity at this time. Six hours later the fluoroscope was used and showed the injury to be a simple dorsal displacement of the trapezoid.

Eight hours later I attempted to reduce the deformity. In this I was only partially successful. I made extension on the index finger, and, at the same time, made direct pressure on the dorsal swelling. The deformity was partially reduced, but the displaced bone still projected nearly one-fourth of an inch beyond the dorsal surfaces of the other carpal bones. I then held the hand in a straight position—neither flexed nor extended on the forearm—and wound a piece of adhesive plaster, two inches wide, several times around the wrist just above the carpal extremities of the metacarpal bones of the thumb and little finger. The extremity was placed in a sling, and the patient was told to return to the hospital on the third day. He did not come back, and I did not succeed in finding him till fifteen weeks later. At this time the deformity was the same as it was after I had attempted to reduce it, except that the bone was firmly fixed and its borders and angles could not be made out. There was no limitation of motion in the wrist-joint.



Skiagraph showing dislocated trapezoid.

The patient told me that he carried the injured member in a sling for five days. He then went to work on the police force, and on the tenth day after the injury he removed the adhesive plaster. He said that the wrist had pained him somewhat when he used it, but that it was gradually improving and was nearly as strong and as useful as it ever had been.

I tried experimentally, on the cadaver, to produce dorsal dislocations of the trapezoid by simulating the mode of production in these two cases. I had the arm and wrist held both in the flexed and in the straight positions, and applied force to the distal end of the metacarpal bone of the index finger and to the metacarpal bones of the index finger and thumb. In each of the twelve wrists that I experimented on either the metacarpal bone of the index finger was fractured, or the ligaments were so torn as to render it impossible to apply force in the direction desired. In no case was I able to produce a simple uncomplicated dorsal displacement of the trapezoid. From the results of the foregoing experiments it seemed probable to me that the exciting cause—trauma—is not, under ordinary circumstances, sufficient to produce the injury being discussed. I therefore looked for predisposing factors, and my attention first turned to the anatomy of the parts involved.

The trapezoid is wedge-shaped, the base of the wedge forming the dorsal surface of the bone. Its superior and inferior surfaces are concave from before backward, but the concavity, in most cases, is slight, and doubtless aids but little in keeping the bone in its normal position. Therefore, pressure brought to bear on the lateral or superior or inferior surfaces of the trapezoid will tend to displace it in a posterior or dorsal direction. Under ordinary circumstances, it is probable that pressure on the lateral surfaces of the trapezoid has very little effect in displacing it dorsally; and force applied to the distal end of the metacarpal bone of the index finger is transmitted to the trapezium and os magnum. These observations led me to believe that the shape of the trapezoid predisposes it to dorsal displacement, and this I verified by the following experiments: After freeing the trapezoid from the other carpal bones, and after separating the trapezium from the os magnum so that force applied to the distal end of the metacarpal bone of the index finger would affect the trapezoid, I was able, on the cadaver, to produce simple dorsal dislocations of this bone by holding the forearm and wrist firmly and applying force to the distal end of the second metacarpal. Slight flexion of the metacarpi on the carpal bones facilitated the displacements. In the normal adult this dislocation is prevented from occurring by the presence of the soft tissues—principally by the ligaments.

The ligaments of the trapezoid are usually divided, for description, into dorsal, palmar, and interosseous. The palmar ligaments are stronger than are the dorsal, and the dorsal ligaments of the trapezoid are less strong than are the corresponding ones of any other carpal bone of the second row except the trapezium. The interosseous ligament between the trapezoid and the os magnum is situated near the dorsal surfaces of the bones. Morris says that there is no interosseous ligament between the trapezoid and the trapezium. Other writers claim that this ligament is present in the majority of cases. I was unable to find a report of examinations made to determine the percentage of cases in which this ligament is absent. I have examined fourteen cases, and have found in each case an interosseous ligament between the trapezoid and the trapezium.

It occurred to me that I might be able to produce an artificial dislocation of the trapezoid in cases in which the interosseous ligament between this bone and the trapezium was absent or had been divided. I therefore cut the ligament and then tried to dislocate the trapezoid dorsally by holding the forearm and wrist firmly and applying force to the distal end of the metacarpal bone of the index finger. I did this in ten cases, but failed to produce a single uncomplicated dorsal displacement. I then, in the same cases, divided the dorsal ligaments between the trapezoid and the metacarpal bone of the index finger. After doing this I was able, by using the method described in the foregoing, to dislocate the trapezoid posteriorly in every case. But the results were not all alike—sometimes the bone would be displaced a distance corresponding to one-fourth or one-half of its anterior-posterior diameter; again, it would be thrown dorsally only a few lines.

These observations and experiments led me to believe that it was probable that in Gay's case, and in the case that came under my care, there was a congenital weakness or absence of the ligaments, or a maldevelopment of the carpal bones, or a combination of these conditions which rendered it possible for an uncomplicated dorsal dislocation of the trapezoid to be produced.